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Hydraulic Fluid Serves as Mandrel for Small Diameter Refractory Tube Drawing

The problem:

To produce high quality small diameter refractory metal tubing. Commercial availability of such tubing materials is limited generally because fabrication parameters have not been established and some of the usual commercial practices (high production, low cost) are often not amenable to the production of tubing of these materials.

The solution:

Seal hydraulic fluid within the tube and pass the tube through a reducing die. The encased fluid eliminates the need for mandrel or ductile core removal and drawing can proceed with less handling operations.

How it's done:

One end of the tube is sealed, and hydraulic fluid is pumped into the open end to a fairly high pressure. The open end is then either sealed or is left connected to the hydraulic pump, and a valve is closed to maintain a constant volume. The enclosed incompressible fluid effectively converts the tube to a solid rod. When the tube is drawn through a die, the cavity volume remains constant because of the encased fluid, and the inner and outer diameters are reduced by the same proportions.

Notes:

1. Copper, aluminum, and zirconium tubes have been drawn cold successfully by this method. The tubes were sealed by leaving the hydraulic pump connected to the tube and closing a valve to maintain constant fluid volume.

2. This hydraulic core method of drawing may be used until high production methods have been firmly established. Continued application of this method may prove feasible in some areas of tubing production.
3. Inquiries concerning this innovation may be directed to:

Office of Industrial Cooperation
Argonne National Laboratory
9700 S. Cass Avenue
Argonne, Illinois 60439
Reference: B66-10523

Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be made to:

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